

> -----Original Message-----

> From: Simon  
> Sent:  
> To:  
> Cc: Shelley,Gerald; Dovey,Steve;  
> Subject: RE: Shuttle evaluation  
>

> ...

> In case of future problems where is the fan fuse ?

>  
> It sounds like you will be ready to ship the pump by the end of this  
~ week....If you can have the pump shipped by Friday we can get it back into  
early next week. The sooner the better.

> Please ship the pump to my attention at the Santa Clara office,

>

>

>

>

> Let me know when you ship it.

>

> Thanks

>

> Simon

>

>

>

> -----Original Message-----

> From: John  
> Sent:  
> To: Simon  
> Cc: Shelley,Gerald; Dovey,Steve;  
> Subject: Shuttle evaluation

>

> Simon,

>

> The pump has been repaired and is currently running as expected on our  
test rig. We plan to keep an eye on it for a couple of days and then send  
it back to you. Please let me know where I should send it.

>

> I apologise for the failure as it appears to be all our fault. We forgot  
to put the thermal pad behind the FET's on the PCB, consequently the metal  
case didn't dissipate the heat generated by these devices. The problem was  
compounded by the blown fan fuse. This was also probably down to us, as  
the fan wires were trapped by the assembly of the cover plate.

>

>

> Regards,

>

> John  
>  
> -----Original Message-----  
> From: Simon  
> Sent:  
> To: John Shelley, Gerald;  
> Cc:  
> Dovey, Steve;  
> Subject: RE: Shuttle evaluation  
>  
> Hi John,  
>  
> Our e-mail was down all last week and I am told we have potentially  
> lost e-mails sent between the 15th and 19th - If you have been waiting for  
> an answer I apologise.  
>  
> In the absence of e-mail I phoned last week and spoke with Steve  
> Dovey. On his suggestion we have returned the unit to Shoreham for you to  
> look at.  
> We also speculated that the mis-wiring at may have overloaded  
> certain circuits - they had only connected 24 Volts to one of the three  
> pins where the manual requests it.  
>  
> At we have told the engineers that we suspect that the wiring  
> caused a problem but are still investigating the failure.  
> We have reassured them that we still believe the pump is suitable  
> and are still planning to supply a second unit.  
>  
> are still interested, naturally they want to know on what date  
> we can supply another unit. Farhad is progressing this with  
> in the US. We are thinking that the original pump they ordered for  
> evaluation will be the best way to handle this. We will supervise the  
> wiring but will be much happier if you are able to identify the cause of  
> the problem through inspection of the failed pump.  
>  
> On the application front, I have told you everything I know. I guess  
> our direct approach to the manufacturer is the most likely avenue  
> to learn more. Failing that we will plan to run a vacuum gauge in series  
> with the next pump to determine the operating pressure. If there is  
> anything else you would like to know drop Farhad or me a line.

>  
> Regards  
Simon

> -----Original Message-----

> From: John  
> Sent:  
> To: Simon  
> Cc: ; Shelley, Gerald;  
> Subject: FW: Shuttle evaluation

>  
Simon,

>  
> I can't add a great deal to what's already been said. If you  
> return the pump we can conduct a thorough failure diagnosis. I do not have  
> enough pumps available to simulate the application at the moment, but this  
> will change in the next couple of weeks.

>  
> More specific application details would be useful.

>  
Regards,

> John

> -----Original Message-----

> From: Shelley,Gerald  
> Sent:  
> To: Shuttle evaluation  
> Subject:

> John

> I can't tell the fault on the fan - check the fuse, if not  
> its dead!

> If you want to simulate the problem, you need to try running  
> the pumps at the pressure / flow seen in the field, there is a peak in  
> drive (not motor) power dissipation between roughing and when the knock  
> sensor is in control.

> Regards

> Gerald

> -----Original Message-----

> From:  
> Sent:  
> To: Shelley,Gerald  
> Subject: Shuttle evaluation

> Gerald,

> From Simon's report can you ascertain why the cooling fan  
> does not work ?

> I have loaded several of these pumps by roughing them  
> continuously, the pumps get hot and eventually trip thermally, but the  
> drive never cooks. We have not witnessed the drive temperature high fault  
> code before. This pump ran here for over 200 hours before we sent it.

> I would not have been surprised if the 285 to 660 Torr  
> application had caused the coil fuse to trip, but the drive temperature  
> high fault code baffles me.

> Regards,

> John

> -----Original Message-----

> From:  
> Sent:  
> To:  
> Cc: Dovey,Steve;  
> Subject: Shuttle evaluation

> John

> Yes indeed it appears the drive is cooking.

> The fact that the Normal light is off indicates the  
> machine is not at full stroke and therefore is probably at maximum  
> current.

> This area of operation just below normal is maximum  
> power in the drive, and may require the current limit to be lowered if  
> long term operation is required. The side affect would be that pump

> downtime will increase (but how much?), and the operating pressure seen by  
> the system will rise (the original design was aimed at backing  
> turbos).

> The lack of cooling fan does not help, the case of  
> the plinth should be getting warm on the top surface near the connections  
> to the pump (after several minutes / when it trips). If not its possible  
> the thermal pad between the case and the board is missing.

> How long is it before it trips?

> Assuming there is no build problems, is there any  
> way we can reduce the load on the pump or rest it between cycles?

> Regards

> Gerald

> -----Original Message-----

> From:  
> Sent:  
> To: snelley, Gerald  
> Subject: Shuttle evaluation

> Gerald,

> Drive temperature high ? We haven't seen this  
> before. Any thoughts ?

> Regards,

> John

> -----Original Message-----

> From:  
> Sent:  
> To: ,John: Dovey, Steve  
> Cc:  
> Subject: Shuttle evaluation

> John, Steve,

> We have run into a fault code on the shuttle pump at  
> so need your help interpreting it. Farhad is the local engineer and  
> has been looking after this but as he was on holiday I went in to take a  
> look. I have tried to give you all the information I have, from experience  
> I think you can never get too much !

> When I arrived the pump was connected up to the  
> tool's vacuum manifold via 3 meters of 3/8" tubing.

> The pump was switched off and cold.

> I asked them to turn it on and it started up without  
> problem. The Amber LED was lit but the green LED was not.

> After about 3 minutes the pump tripped off and the  
> amber LED gave the following code ....  
> It was not hot to touch.

> I disconnected the pump from the manifold, plugged  
> the inlet and asked them to re-start it. The pump started again and this  
> time both LEDs lit up and the pump ran happily.

> Suspecting a leak I inspected the tubing and found  
> one big enough to make the wind whistle.

> We fixed that and re-connected the pump.

> Sure enough, both LEDs came on almost immediately  
> and the pump ran fine.

> The technician then showed me the problem he had  
> run into earlier.

> There is a small port on the end of the moving robot  
> arm. Once a wafer is seated on the arm a valve in the line below is opened  
> and the vacuum applied.

> When the wafer was loaded I noticed that the green  
> LED went off and stayed off. After a short period the pump tripped again.  
> giving the same error code as before.

> It looked as if the seal between the wafer and the  
> port was pretty poor so my guess is that this introduces a leak.  
> I could simulate the fault in the lab by running  
> with an open inlet.

>  
> As an aside

>  
> The pressure in the vacuum line beneath the wafer is  
> sensed using an SMC pressure switch and this is used to determine if the  
> wafer is secure.

>  
> At atmosphere this reads 0 and with the QDP40 it  
> reads 720 so I assume it is reading Torr (gauge). With the line open to  
> atmosphere at the robot arm but the valve open to the QDP40 the sensor  
> registers 590. This seems high but I don't know how it works. The  
> manual shed little light on it.

>  
> (The robot is model Aqua-Tran 7 - all the  
> instruction manual says is that it requires 24" of vacuum).

>  
> Using the Shuttle pump instead of the QDP40 gave a  
> reading of 285 (instead of 590) with the pipe open to atmosphere and 660  
> (instead of 720) with a wafer loaded. It seems to give enough suck and the  
> wafer is held firmly. were happy with the 660 figure but the pump  
> does not seem to be judging by the alarm signal.

>  
> I noticed that the fan was not working and checked  
> the wiring to find not all the pins were connected per the instructions.  
>  
> I told ... that I thought the pump had been  
> mis-wired and they agreed to give me the cable so that we could re-wire it  
> in Santa Clara.

>  
> I took the pump and told them that I wanted to check  
> what the fault code meant and would try to get back with them in the  
> middle of next week.

>  
> They like the pump, but are not sure if it is big  
> enough. We agreed to hold off making any final judgements until we know  
> what the alarm code means.

>  
> Other possibly significant information.

>  
> 1) The cooling fan was not operating but I don't  
> think it was mis-wired - it would not work when I tried it in Santa Clara.  
>  
> 2) I checked the wiring and they had connected  
> only a few of the pins as follows - Red to 1, 2 & 3 linked, Black to 8  
> and Green to 13.

>  
> 3) The technician let it slip that they had run the  
> pump for a while with the plug in the exhaust - they did not know which  
> port was the inlet and had mis-interpreted the arrow next to the inlet  
> thinking it indicated exhaust. Apparently the pump got pretty hot (they  
> could not touch it) but did not appear to trip.

>  
>  
> The pump is in Santa Clara on my desk.  
> I am out of the office Monday and Tuesday.  
> Farhad will handle the Lam side of things so please  
> deal with him and copy me.

>  
> Regards

>  
> Simon

>  
> BOC EDWARDS

>  
> \*:

> -----Original Message-----  
> From:  
> Sent:  
> To:  
> Cc: Steele,David-EHVI;  
> Subject: RE: / shuttle opportunity  
>  
> I think there is space for both shuttle and small XDS in our future plans:  
> \* Shuttle meets the low power, small, low cost, low maintenance  
> (hopefully) needs of gc/ms and maybe a proportion of RGA - mainly  
> defensive and some incremental business in the RGA and semicon/robotics  
> sectors.  
> \* Small XDS opens the door for gel drying, freeze drying, rotary evap,  
> centrifuges - mainly growth business  
>  
> However, our TTM record is horrible and I'm concerned that we would  
> struggle to do both effectively, so here's an idea ...  
> 1. Go full steam ahead with the small XDS program - it's going to grow the  
> business.  
> 2. Re-consider diaphragm pumps for the very small dry market - have we  
> closed the door on buying KNF, Vacuubrand, Thomas, Gast or whoever?  
>  
> Looking forward to discussing this with you,  
> Regards,  
> Michael  
>  
>  
> -----Original Message-----  
> From:  
> Sent:  
> To:  
> Cc: Steele,David-EHVI;  
> Subject: / shuttle opportunity  
>  
> Mike,  
> Yes, Ron told me about this and we have exchanged a few e-mails and talked  
> on the phone about it. The situation with the small dry pump is that we  
> had a review of the shuttle with SEO about 5 weeks ago as you know when  
> the cost was £230 - £250 and agreed that we needed to have a radical  
> review of the design to make it viable and we should also consider the  
> small scroll option. A second review was supposed to be held 4 weeks later  
> to make the decision but this has now been postponed until mid September  
> because SEO is very busy.  
>  
> Meanwhile the shuttle team has been busy working on fairly radical new  
> design thoughts (based on an extruded pump body which also houses the  
> electronics) and believe that they have the cost down to £181. Experience  
> would suggest that we ought to assume £200 by the time they have come up  
> against all the problems that they will surely come up against but we  
> might get this lower in the future if we get the volume so from a price  
> point of view I think this looks good. Other advantages of the new design  
> are that it should be easier to put together which makes it a better fit  
> with BOCE manufacturing capabilities (I am not insulting our manufacturing  
> capabilities when I say this but we're not set up to put things together  
> with white gloves and tweezers) and should also be easier to service. It

> is a radical design change however which means that it will take a while  
> to get into production. My other worry about it is that it is still a  
> valve based pump like a diaphragm pump and is therefore always going to  
> struggle to get good ultimates and keep them in the face of moisture and  
> particles which is a definite negative relative to a scroll.  
>  
> The plan ahead therefore is that we agree a plan in mid September which  
> needs to cover:  
> \* do we do the new style shuttle and forget about small scrolls at  
least for the moment  
> \* if we do the new style shuttle do we make a load of current style  
shuttles for example for to get the market warmed up and to get field  
experience of the shuttle mechanism  
> \* do we go for a small scroll as our intended small dry solution for  
the next few years and keep the shuttle running on a back burner in case  
it's low power, small size feature make it desirable to have as well as a  
small scroll in the future  
> \* do we try to do small scroll and shuttle in parallel  
>  
> Peter Coxon is supposed to be writing a report summarising the merits,  
etc. of the different choices. Assuming this is ready before the meeting I  
will send you a copy for your comments. I would say however that I cannot  
see how we could sensibly do bullet 2 in timescales. The reason is  
that the continued testing of the current shuttles is showing a number of  
problems which can be overcome in the new design but which would need  
quite a bit of work to get sorted in the current design. We would  
therefore need to take resource away from the future design team to patch  
up the current design plus do all the work to get it into some form of  
production. In addition, whilst it might be possible to get into non-std  
production sufficient to produce a load of evaluation units it is a very  
different thing to produce products that we could sell to an OEM which  
implies to be a proper product launch and a commitment to support in the  
future.  
>  
> I left it with Ron to find out a bit more about what requirements  
were - would they be happy with a fairly drastic change in design in pump  
after a year for example. I have also asked the shuttle team to give me an  
idea of the work required to get the current design into non-std or std  
production. Please let me have your thoughts and I'm sure we will talk  
about it in September in the US as well.  
>  
>  
> Regards,  
> James  
>  
> -----Original Message-----  
> From:  
> Sent:  
> To:  
> Cc: Steele,David-EHVI  
> Subject: / shuttle opportunity  
>  
> James,  
> Seems like we might inadvertently have got rather interested!  
> They are now favoring it as their #1 option for the vacuum chuck on  
their atmospheric robot.  
> Ideal timescales for them are 15 units in October and then -100/year  
from March 2001.  
>  
> So, thought I'd throw that into the mix. They would pay \$1000 per  
unit - might pay for a molding tool or something.  
>  
> Let's have a more serious discussion in the next few days - I cannot  
recall the date for the next decision making gate.  
>  
> Regards,  
> Michael